

RULE 1159

Stationary Gas Turbines

(A) General

- (1) Purpose:
 - (a) The purpose of this Rule is to limit the emission of oxides of nitrogen from commercial, industrial and institutional stationary gas turbines.
- (2) Applicability:
 - (a) This rule applies to any existing non-utility combined-cycle, commercial, industrial or institutional stationary gas turbine of 0.3 megawatt (MW) and larger unless the equipment is exempt from this rule pursuant to Section (D) of this rule **or** the turbine is located outside of the Federal Ozone Non-attainment Area of the Mojave Desert Air Quality Management District (District).

(B) Definitions

- (1) "Combined-cycle Unit" - Any stationary gas turbine operated both for the production of electrical energy from shaft work and the useful energy produced from heat recovered from its exhaust gases.
- (2) "Emission Control System Operating Parameters" - Any operating parameter(s) that the District deems necessary to analyze for the determination of compliance. Such parameters include, but are not limited to, the ammonia and gas flow rates, the exhaust temperature for the SCR, humidity, water injection rate, exhaust gas flow rate and the temperature for water injection.
- (3) "Emergency Standby Unit" - Any stationary gas turbine that operates as a mechanical or electrical power source for a facility only when the primary power source has been rendered inoperable due to failure beyond the reasonable control of the operator. A power interruption pursuant to a voluntary interruptible power supply agreement is not to be considered as an emergency loss of primary power. Electricity generated by such a unit cannot be sold.

- (4) "Enhanced Emissions Monitoring Device" - Any automated data recording device or system having both data gathering and retrieval capabilities. Such equipment includes, but is not limited to, Continuous Emissions Monitoring Systems (CEMS) and Predictive Emissions Monitoring Systems (PEMS).
- (5) "Federal Ozone Non-attainment Area" That portion of San Bernardino County that lies within the lines which begin at: (a) the San Bernardino - Riverside County boundary, running north along the range line common to Range 3 East and Range 2 East; (b) then west along the township line common to Township 2 North and Township 3 North; (c) then north along the San Bernardino - Los Angeles County and San Bernardino - Kern County Boundaries; (d) then east along ;latitude 35 degrees, 10 minutes north; (e) then south along longitude 115 degrees, 45 minutes west and westward along the San Bernardino - Riverside Counties boundary.(see Map 1).
- (6) "Higher Heating Value (HHV)" - The higher heating value of the fuel.
- (7) "Lower Heating Value (LHV)" - The lower heating value of the fuel.
- (8) "Measured NOx Emissions Concentration" - The concentration of oxides of nitrogen corrected to International Standards Organization (ISO) standard conditions:

$$\text{NOx} = (\text{NOx obs})(\text{Pref/Pobs})^{0.5} (288 \text{ K/Tamb})^{1.53} (e^{19(\text{Hobs}-0.00633)})$$

Where:

- NOx = emissions of NOx at 15 percent oxygen and ISO standard conditions on a dry basis, ppm.
- NOx obs = measured NOx emissions corrected to 15 percent oxygen on a dry basis, ppm.
- Pref = standard reference pressure, (14.696 psia).
- Pobs = measured site ambient absolute pressure, psia.
- Hobs = measured humidity of ambient air, pounds water per pound dry air.
- e = transcendental constant (2.718)
- Tamb = measured temperature of ambient air, degrees K.

or an alternate calculation that corrects to ISO standard conditions and is approved by the APCO.

- (9) "Power Augmentation" - An increase in the gas turbine shaft output and/or the decrease in gas turbine fuel consumption by the addition of energy recovered from exhaust heat.

- (10) "Public Service Unit" - A stationary gas turbine used to generate electricity for sale or for use in serving the public.
- (11) "Rating" - The continuous megawatt (MW) rating or mechanical equivalent by a manufacturer for gas turbine(s) without power augmentation.
- (12) "Stationary Gas Turbine or Unit" - Any gas turbine system that is gas and/or liquid fueled with or without power augmentation. This unit is either attached to a foundation at a facility or is portable equipment operated at a specific facility for more than 90 days in any 12-month period. Two or more gas turbines powering one shaft shall be treated as one unit.
- (13) "Thermal Stabilization Period" - The start up or shut down time necessary to bring the heat recovery steam generator to the proper operating temperature, not to exceed two hours.

(C) Standards

- (1) The owner or operator of any affected stationary gas turbine unit shall not operate such unit under load conditions, excluding the thermal stabilization period which results in the measured NO_x emissions concentration exceeding the emissions limits set forth below:
 - (a) For stationary gas turbines which are not subject to the alternative federal NO_x RACT limits of Subsection (C)(1)(b), the following federal NO_x RACT limits apply:
 - (i) For gas-fired turbines, 42 ppmv NO_x
 - (ii) For oil-fired turbines, 65 ppmv NO_x
 - (b) For the Southern California Gas Company Turbine Model LM 1500, the following alternative federal NO_x RACT limits shall apply:
 - (i) 90 ppmv NO_x when fired with gaseous fuel
 - (c) For the purposes of these emissions limits the following conventions are applicable:
 - (i) Gas includes natural, digester and landfill gases.
 - (ii) Oil includes kerosene, jet fuel, and distillate. The sulfur content of the oil shall be less than 0.05%.
 - (iii) NO_x = emissions of NO_x, in ppmv, corrected to 15 percent oxygen and ISO standard conditions on a dry basis, averaged over any consecutive 15 minute period.

- (2) The owner or operator of any affected stationary gas turbine shall submit to the APCO for approval, an Emission Control Plan (ECP) for the purpose of establishing an exemption status pursuant to Section (D) or to establish compliance with provisions of this rule.

(D) Exemptions

- (1) The provisions of Section (C) of this rule shall not apply to the operation of:
 - (a) Laboratory units used in research and testing for the advancement of gas turbine technology.
 - (b) Units operated exclusively for fire fighting and/or flood control.
 - (c) Combined-cycle turbines operating as an electric utility which are subject to Rule 1158.
- (2) The provisions of this rule, with the exception of Section (F)(e), shall **not** apply to the operation of stationary gas turbines used under the following conditions:
 - (a) Emergency standby units demonstrated to operate less than 200 hours per calendar year,
 - (b) Units rated less than 4 MW and operating less than 877 hours per calendar year.
- (3) Any facility within the federally designated ozone non-attainment area containing an affected stationary gas turbine which is classified as exempt or claiming to be exempt under this subsection, shall meet the record keeping requirements of Section (F)(e) of this rule to establish the exempt classification or claimed exemption.

(E) Administrative Requirements

- (1) **Emission Control Plan** The ECP required pursuant to section (C)(2) shall, at a minimum, include the following information if such information is applicable:
 - (a) A list of all stationary gas turbines required to be controlled pursuant to this rule.
 - (b) For each stationary gas turbine listed:

- (i) District identification number, and District Permit to Operate number,
- (ii) Name of the gas turbine manufacturer,
- (iii) Equipment model number,
- (iv) Manufacturer's rated shaft power output (MW),
- (v) Type of liquid fuel and/or type of gaseous fuel,
- (vi) HHV for each fuel,
- (vii) Heat rate ((BTU/KW-HR), corrected to the HHV) for each type of fuel (gas or liquid) for each turbine
- (viii) Monthly fuel consumption for the pervious twelve-month period (cubic feet for gas; gallons for liquid)
- (ix) Monthly hours of operation in the previous twelve-month period.
- (x) The type of NO_x emission control equipment, including any auxiliary equipment related to the control of emissions, to be applied.
- (xi) Documentation showing the current (existing) concentration and mass rate of emissions of oxides of nitrogen from the unit.
- (xii) A schedule with specified increments of progress dates for construction of emissions control equipment, operational milestones for implementation of emissions control and/or installation of monitoring equipment.
- (xiii) A final compliance date.

(F) Monitoring and Recordkeeping Requirements

- (1) The owner or operator of any affected stationary gas turbine shall:
 - (a) Install, operate, and maintain in calibration, emissions monitoring equipment, as approved by the APCO, that continuously measures and records the following:
 - (i) Emissions Control System Operating Parameters, and
 - (ii) Elapsed time of operation; and
 - (b) notify the APCO, in writing, that the facility has an enhanced emissions monitoring device and specify the data gathering and retrieval capacities thereof.
 - (c) notify the APCO, in writing, before issuance of the Permit To Operate, such information which correlates the Emission Control System Operating Parameters to the associated measured NO_x emissions output. This information will be used to determine compliance with applicable provisions of this rule for non-CEMS-equipped turbines and CEMS-equipped units when the CEMS is not operating properly.

- (d) Provide, on an annual basis, compliance testing data and information regarding NO_x emissions. The data shall be corrected to ISO conditions and at 15 percent oxygen on a dry basis; **and** the percent efficiency (EFF) of each turbine unit.
- (e) For each unit and on a daily basis, maintain a turbine operating log that includes, as a minimum, the following information: the total hours of operation per day; the accumulated hours of operation per calendar month; and the type and quantity of fuel used.

(G) Notification Requirements for Exempt and Emergency Standby Units

- (1) Any stationary gas turbine unit which is exempt or claimed to be exempt pursuant to subsection (D)(2) shall:
 - (a) Notify the APCO within seven days if the hour-per-year threshold is exceeded.
 - (i) If the hour-per-year threshold is exceeded, the exemption pursuant to subsection (D)(2) shall be permanently withdrawn.
 - (ii) If the hour-per-year threshold is exceeded the owner/operator shall, within 30 days of the notification, submit an application for a Permit to Operate to the District. Such application shall including a plan detailing actions and a schedule of progress to meet the applicable RACT limits and provisions of this rule within 24 months after the date of the notification; an Emission Control Plan conforming to the requirements of Section (E) for the emissions control equipment.
- (2) Notwithstanding the provisions of Sections (F)(2) and (G)(1) above, A public service unit shall not be subject to the hour-per-year threshold when:
 - (a) Such unit is operating during a state of emergency declared by a proclamation of the Governor of the State of California; and
 - (b) Such unit is located within the specific geographic location identified in the state of emergency proclamation.

(H) Test Methods

- (1) Compliance testing shall be subject to the protocols prescribed in the District's Compliance Procedural Manual.

- (2) The following test methods shall be used to determine compliance with the provisions of this rule.
 - (a) NO_x Emissions shall be determined by EPA Test Method 20.
 - (b) The Higher Heating Value (HHV) and the Lower Heating Value (LHV) shall be determined by the appropriate method for the fuel type listed below:
 - (i) For liquid fuels:
 - a. ASTM Test Method D 240-87 (Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter).
 - (ii) For distillate fuel:
 - a. ASTM Test Method D 2382-88 (Standard Test Method for Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter - High Precision Method); **or**,
 - (iii) For gaseous fuels:
 - a. ASTM Test Method D 3588-91 (Standard Practice for Calculation Heat Value, Compressibility Factor, and Relative Density (Specific Gravity) of Gaseous Fuels); **or**
 - b. ASTM Test Method D 1826-88 (Standard test Method for Caloric (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter); **or**
 - c. ASTM Test Method D 1945-81 (Standard Method for Analysis of Natural Gas by Gas Chromatography).

(I) Compliance Schedule

- (1) The owner/operator of an stationary gas turbine subject to the provisions of Section (C) above shall comply with the following increments of progress:
- (2) An Emissions Control Plan shall be submitted to the District on or before April 15, 1995. The District shall approve the Plan on or before May 31, 1995.
- (3) On and after May 31, 1995, any affected turbine shall be in full compliance with all applicable provisions of the rule.
- (4) Demonstrate final compliance with all applicable standards and requirements of the rule within six months of the installation of the NO_x reduction technology.

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